

Health Consultation

Master Park Site
Near Intersection of South 160 Street and
International Boulevard
SeaTac, King County, Washington

January 6, 2006

Prepared by

**The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry**



Foreword

The Washington State Department of Health (DOH) has prepared this health consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the U.S. Department of Health and Human Services and is the principal federal public health agency responsible for health issues related to hazardous waste. This health consultation was prepared in accordance with methodologies and guidelines developed by ATSDR.

The purpose of this health consultation is to identify and prevent harmful human health effects resulting from exposure to hazardous substances in the environment. Health consultations focus on specific health issues so that DOH can respond to requests from concerned residents or agencies for health information on hazardous substances. DOH evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health. The findings in this report are relevant to conditions at the site during the time of this health consultation, and should not necessarily be relied upon if site conditions or land use changes in the future.

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Glossary

<p>Aquifer</p>	<p>An underground formation composed of materials such as sand, soil, or gravel that can store and/or supply groundwater to wells and springs.</p>
<p>Comparison value</p>	<p>Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.</p>
<p>Contaminant</p>	<p>A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.</p>
<p>Indeterminate public health hazard</p>	<p>The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.</p>
<p>Model Toxics Control Act (MTCA)</p>	<p>The hazardous waste cleanup law for Washington State.</p>
<p>Monitoring wells</p>	<p>Special wells drilled at locations on or off a hazardous waste site so water can be sampled at selected depths and studied to determine the movement of groundwater and the amount, distribution, and type of contaminant.</p>
<p>Parts per billion (ppb)/Parts per million (ppm)</p>	<p>Units commonly used to express low concentrations of contaminants. For example, 1 ounce of trichloroethylene (TCE) in 1 million ounces of water is 1 ppm. 1 ounce of TCE in 1 billion ounces of water is 1 ppb. If one drop of TCE is mixed in a competition size swimming pool, the water will contain about 1 ppb of TCE.</p>
<p>Plume</p>	<p>A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.</p>
<p>Volatile organic compound (VOC)</p>	<p>Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.</p>

Summary and Statement of Issues

The Washington State Department of Health (DOH) conducted this health consultation in response to information obtained from the Washington State Department of Ecology (Ecology) regarding groundwater contamination discovered in the regional aquifer at the Master Park site in SeaTac, Washington. The regional aquifer, which underlies a commercial and residential area, may serve as a water supply for the City of Seattle. The purpose of the health consultation is to evaluate whether contaminants found in the groundwater below the Master Park site poses a health threat to nearby drinking water wells or indoor air. DOH prepares health consultations under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

Background

Petroleum contaminated groundwater was discovered in November 2000 at the Master Park site, located along the west side of the 16000 block of International Boulevard (Highway 99) with the highest contaminant concentrations detected near the southern boundary of the Loudon site, a small piece of property that Ecology has determined is a potential source of the groundwater contamination detected at the adjacent Master Park site.¹ However, no environmental investigations have been conducted at the Loudon site to confirm that it is the source of the contamination detected in groundwater below the Master Park site.

High levels of gasoline and benzene, toluene, ethylbenzene, and xylenes (BTEX) constituents have been found in the regional groundwater aquifer below the Master Park site during three environmental investigations. However, the lateral and vertical extent of the groundwater contamination has not been determined. Elevated levels of volatile contaminants were also detected in soil gas below the Master Park site. Neither the nature nor the lateral or vertical extent of the contaminated soil gas has been investigated. The Master Park site is located in a mixed residential and commercial area (Figure 1). Washington Memorial Park Cemetery is located along the west side of the site, International Boulevard is located to the east, and the Loudon property is located to the north.

Currently the Master Park site consists of a parking lot with a small building (Figure 1). Historically this site was occupied by various commercial facilities that used or handled petroleum products, chlorinated and non-chlorinated solvents, as well as other chemicals (e.g., styrene) including, but not limited to:

- Chlorinated and non-chlorinated solvents used for cleaning equipment parts.
- Solvents, styrene, and resins used during manufacturing.
- Petroleum compounds and solvents from painting
- Gasoline and/or diesel fuel contained in underground storage tanks (USTs) and used for fueling.

The commercial facilities also generated wastes containing petroleum, solvents, and other chemicals:

- Petroleum compounds and metals from waste oil and hydraulic oil.
- Petroleum compounds and metals from vehicle leaks.

- PCBs from some hydraulic oils.
- Oily surface water run-off.²

The Loudon site consists of a small building used as a real estate office, which according to the current property owner has been there since 1956. Both sites are served by the City of SeaTac municipal water and sewer systems.

Other possible sources of contamination exist in the area that could affect groundwater quality in the regional aquifer. However, none of the environmental investigations done at or near the Master Park properties indicate they are the source of petroleum contamination discovered in the regional aquifer. The Dollar Rent-A-Car facility is located in the northeast quadrant of the intersection of International Boulevard and South 160th Street, and Time Oil property is located in the southeast quadrant across from Dollar Rent-A-Car facility (Figure 1). The Dollar Rent-A-Car property currently has an active fueling gas station, but no contamination has been reported at this facility.³ Excavation work was done by the City of SeaTac in the right-of-way next to the Dollar facility and revealed an old gasoline pump island.³ The Time Oil Company did install a monitoring well and tested for contaminants in the regional aquifer. No data were available at the time of this health consultation. However, Ecology reports that Time Oil did not detect any petroleum contamination in this part of the regional aquifer.⁴ Time Oil Company also conducted an environmental investigation at the southeast quadrant of the intersections of International Boulevard and South 160th Street, but the source of the contamination in the regional aquifer did not appear to originate there.

The Bai Tong Restaurant, which is located in the northwest quadrant of the intersection of South 160th Street and International Boulevard, was also considered another possible source of the petroleum contamination found in the regional aquifer. An environmental investigation conducted by the Port of Seattle, however, found no evidence of petroleum contamination below the property.³

Site Visit

On Feb 15, 2005, DOH staff, accompanied by a Department of Ecology representative, conducted a site visit, which included observing conditions at the Master Park, Loudon Real Estate Incorporated, and other commercial sites (e.g., Dollar Car Rental, Time Oil Company Property, and Bai Tong Restaurant) sites. Apartments and single-family residences were observed east and south of the Time Oil site.

Environmental Investigations

Three phases of environmental investigation have been conducted at the Master Park site. Several perched water zones were observed during these investigations. These perched zones do not appear to be continuous and were encountered in the borings drilled on the east side and in the central portion of the site.⁵ There were no perched water zones reported on the west portion of the site. A glacial till unit separates the perched water zones from the underlying regional aquifer. It is not known whether groundwater from the perched water zone aquifer discharges to the regional aquifer located below it. However, recent scientific evidence has confirmed the

presence of small cracks or joints in tills that can potentially allow the transport of contaminants through these dense soils.⁶

The top of the regional aquifer is approximately 35 feet below ground surface within the Master Park site.^{5,2} The groundwater flow direction within the regional aquifer was estimated using water level measurements collected from various monitoring wells within the area during various time periods. In general, the horizontal gradient at the Master Park site is relatively flat. The direction of the groundwater within the regional aquifer appears to flow toward the west-southwest. However, it was reported that the groundwater flow can vary with changes in seasonal recharge.²

A brief overview of the investigations conducted and potential contaminants found at the Master Park site are summarized below:

- A Phase I environmental investigation was conducted in October 2000. The Phase I identified a number of recognized potential environmental conditions at the site. These environmental conditions included the potential for soil, and groundwater contamination as a result of historic site activities.⁷
- The Phase II investigation was conducted in November 2000, and consisted of sampling and laboratory analysis to screen for potential contaminants in soil and groundwater. Twenty locations were sampled. Samples were analyzed for total petroleum hydrocarbons (TPHs), benzene, toluene, ethyl-benzene and xylene (BTEX), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and total metals.² The investigation also confirmed the presence of three underground storage tanks (USTs) at the site.

During Phase II, monitoring well MW-1 located in the northwest portion of the property, near the former AirPro repair shop, was completed at an approximate depth of 52 feet below ground surface (bgs). Groundwater from the well was sampled and analyzed and concentrations of gasoline range petroleum hydrocarbons and BTEX were detected substantially above the Model Toxics Cleanup Act (MTCA) groundwater cleanup levels, which are levels intended to be protective of groundwater used as a drinking water source.⁵ MTCA is the hazardous waste cleanup law for Washington State. The MTCA cleanup standards are intended to be protective of human health and the environment.⁸

The concentrations of gasoline in MW-1 ranged from 57,000 µg/L to 71,000 µg/L, which exceeds the MTCA Method A groundwater cleanup level for gasoline of 800 µg/L. This cleanup level is based on protection of groundwater for non-carcinogenic health effects during drinking water use.⁸ The concentrations of benzene (2,800 µg/L), toluene (7,300 µg/L), ethyl-benzene (1,300 µg/L), m, p xylene (5,100 µg/L), and o-xylene (1,800 µg/L) also exceeded MTCA Method A cleanup levels of 5 µg/L (benzene), 1,000 µg/L (toluene), 700 µg/L ethyl-benzene, and 1,000 µg/L (total xylenes), respectively

- The Phase III environmental investigation was conducted in January 2001, and consisted of the drilling, installation, and sampling of five shallow (<60 feet deep) monitoring wells

and one deeper (~100 feet deep) monitoring well. All the wells were installed in the regional aquifer.⁵ Photo ionization detector (PID) readings were taken as the monitoring well was drilled. PID readings from monitoring wells 7, 9 and 10 indicated soil gas contaminated with volatile chemicals exists at approximately 35 – 50 feet bgs in the regional aquifer as noted by strong TPH odors.⁵ However, no soil gas probes were installed to investigate whether shallow soil gas levels posed a possible indoor air health risk at the Master Park site or to nearby properties.

During the drilling of each monitoring well, soil samples were collected for chemical analysis. None of the soil samples had detectable gasoline or BTEX compounds, except for one sample collected from 50 feet bgs at monitoring well MW-10. The concentrations reported for gasoline range petroleum hydrocarbons at this well had levels of 300 mg/kg above the MTCA Method A soil cleanup level (100 mg/kg). BTEX compounds were detected in soil at concentrations of 0.88 mg/kg, 8.7 mg/kg, 3.0 mg/kg and 18.7 mg/kg, respectively. The benzene, toluene and total xylene levels exceeded the MTCA Method A cleanup level of 0.03 mg/kg, 7 mg/kg, and 9 mg/kg, respectively.

Groundwater monitoring wells were completed in the regional aquifer (MW-1, MW-5, MW-6, MW-7, MW-8a, MW-9, and MW-10). High concentrations of gasoline ranging from 57,000 µg/L to 90,000 µg/L were detected in the groundwater samples collected from MW-1, MW-7 and MW-9. The groundwater samples collected within a deeper portion from the aquifer at MW-10 was reported with 1,600 µg/L of gasoline. The concentrations of gasoline detected in MW-1, MW-7, MW-9, and MW-10 exceed the MTCA Method A cleanup level for gasoline of 800 µg/L.⁵ The concentrations of BTEX constituents in groundwater samples collected from the regional aquifer also exceeds the MTCA Method A clean up level (5 µg/L). Benzene was detected in MW-1 (2,800 µg/L), MW-7 (470 µg/L), MW-9 (1,900 µg/L), and MW-10 (31 µg/L). The concentrations of toluene, ethylbenzene, and total xylenes also exceeded MTCA Method A cleanup level.

Natural Resource Use

The Washington Memorial Park Cemetery is located west of the Master Park groundwater contaminant plume. The cemetery has a well that pumps water from the regional aquifer to water the lawns. One groundwater sample was collected from the cemetery well on July 23, 2001. The cemetery well was tested for gasoline and BTEX compounds in October 2001. No contamination was found at that time.⁹

Some City of Seattle water supply wells (Group A wells) are located within a mile of the Master Park site. Group A wells are Washington public water supply wells with 15 or more connections and are regularly tested for hazardous substances. Groundwater samples were collected from these wells at a depth of approximately 270 feet and 359 feet in 1988, 1989, 1993, 1995, 1998 and 2002 by Seattle Public Utilities (SPU) (Figure 2). The samples were analyzed for metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs).¹⁰ However, no VOCs, SVOCs, or metals were detected.

Other domestic and irrigation wells have also been identified in the regional aquifer in the vicinity of the Master Park site.¹¹ However, it is unknown whether these wells are located up or downgradient of the contaminated groundwater on the Master Park site because the groundwater flow direction below the Master Park site is uncertain at this time.

Discussion

Groundwater quality at the Master Park site has been evaluated at various times since October 2000. Groundwater analytical results obtained from the regional aquifer at the site reveal the presence of petroleum contaminants (e.g., gasoline, BTEX) associated with past site operations. However, the lateral and vertical extent of this groundwater contamination has not been determined. In addition, it is unknown whether the elevated levels of volatile chemicals detected during soil gas screening conducted during the environmental investigations at the site pose an indoor air health threat.

The levels of petroleum contaminants detected in groundwater below the Master Park site exceed the Washington State MTCA groundwater cleanup levels which are intended to be protective for drinking water use. Some public water supply wells were tested about a mile downgradient of the site by the Seattle Public Utilities and an irrigation well at the adjacent cemetery was tested as part of the Master Park investigation. These wells do not appear to have been affected by the contaminated groundwater found at the Master Park site. However, no well survey appears to have been conducted to determine whether any other drinking water wells exist in the area that might be affected by the undefined groundwater contaminant plume discovered at the Master Park site. Therefore, DOH cannot determine whether the contamination discovered in the regional aquifer poses a health risk.

PID readings taken during drilling at the Master Park site indicate that significant levels of volatile chemicals exist in soil gas below that site. This indicates that chemicals are likely volatilizing from the groundwater and moving up through the soil column. Volatile chemicals in soil gas can move into overlying or nearby buildings through cracks or other openings in the foundations (e.g., basements, crawlspace, and slabs) posing a potential indoor air health risk to building occupants. Contaminants in soil gas can also travel along utility lines, which often can contain more permeable soils than the native soils, posing a possible indoor air health risk. No soil gas or indoor air sampling and analysis was done during the Master Park investigations to evaluate the groundwater to indoor air exposure pathway. Consequently, DOH cannot determine whether soil gas associated with the contaminated groundwater poses an indoor air health threat.

Child Health Concerns

Children could potentially be exposed to contaminants migrating from contaminated groundwater if measures are not taken to reduce such exposures. Children can be uniquely vulnerable to the hazardous effects of environmental contaminants. When compared to adults, pound for pound of body weight, children drink more water, eat more food, and breathe more air. These facts lead to an increased exposure to contaminants. Additionally, the fetus is highly

sensitive to many chemicals, particularly with respect to potential impacts on childhood development. For these reasons, DOH considers the specific impacts that contaminated groundwater might have on children, as well as other sensitive populations.

Conclusions

The Master Park site poses an *indeterminate public health hazard* because there is inadequate information to determine whether the groundwater contaminant plume found on the Master Park site poses a health threat to nearby drinking water wells or indoor air.

- High concentrations of gasoline including BTEX compounds have been detected in the regional aquifer below the Master Park site but the lateral and vertical extent of that contamination has not been determined.
- Although the existing drinking Group A wells and wells used for irrigation purposes within a mile from the Master Park site do not show contamination like that discovered at the Master Park site, the potential exists for unidentified drinking water wells in the vicinity of the Master Park site to be at risk from the contaminated groundwater plume.

People that live or work in the vicinity of the Master Park site can be exposed to contaminants migrating from the contaminated groundwater into overlying or adjacent buildings through cracks and/or around utility pipes posing an indoor health threat. No soil gas or indoor air data is available to determine if this is a possible exposure pathway.

Recommendations

- Ecology or the potentially liable party (PLP) should determine the nature and extent of the groundwater contamination.
- The Department of Ecology (Ecology) or the PLP should conduct a well survey as soon as possible to identify whether private or public water supply wells exist in the vicinity of the plume that are affected or potentially affected by the contaminated groundwater discovered at the Master Park site.
 - Any public or private wells that are potentially affected by the petroleum contaminated groundwater should be tested by Ecology or the PLP to confirm that contaminant levels are below levels of health concern. The wells should also be sampled at an appropriate frequency and the samples analyzed for contaminants of concern to evaluate whether there are seasonal differences in contaminant types and concentrations in groundwater. Subsequent sampling and analysis should be based on the findings from the initial sampling rounds.
- Ecology or the PLP should evaluate the groundwater to indoor air pathway to ensure that no one is being exposed to harmful levels of groundwater contaminants via indoor air. Part of that evaluation should include contacting property owners/occupants in the vicinity of the site to determine if petroleum odors have been detected in buildings. In addition, Ecology or the PLP should consider installing soil gas probes and/or conduct indoor air sampling to determine if vapors from the contaminated groundwater are moving up through the soil column and potentially entering overlying or adjacent buildings.
- Because contaminants are present in the groundwater at levels of health concern, no drinking water wells should be drilled immediately downgradient of the Master Park site.

Public Health Action Plan

1. Copies of this health consultation will be provided to Ecology and Potentially Liable Parties.
2. DOH is available to review data, plans, and reports generated as a result of the above recommendations.
3. DOH will post this health consultation report on its web site to make it available to the general public.

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**Figure 1 – Vicinity Map
Master Park Site
SeaTac, Washington**

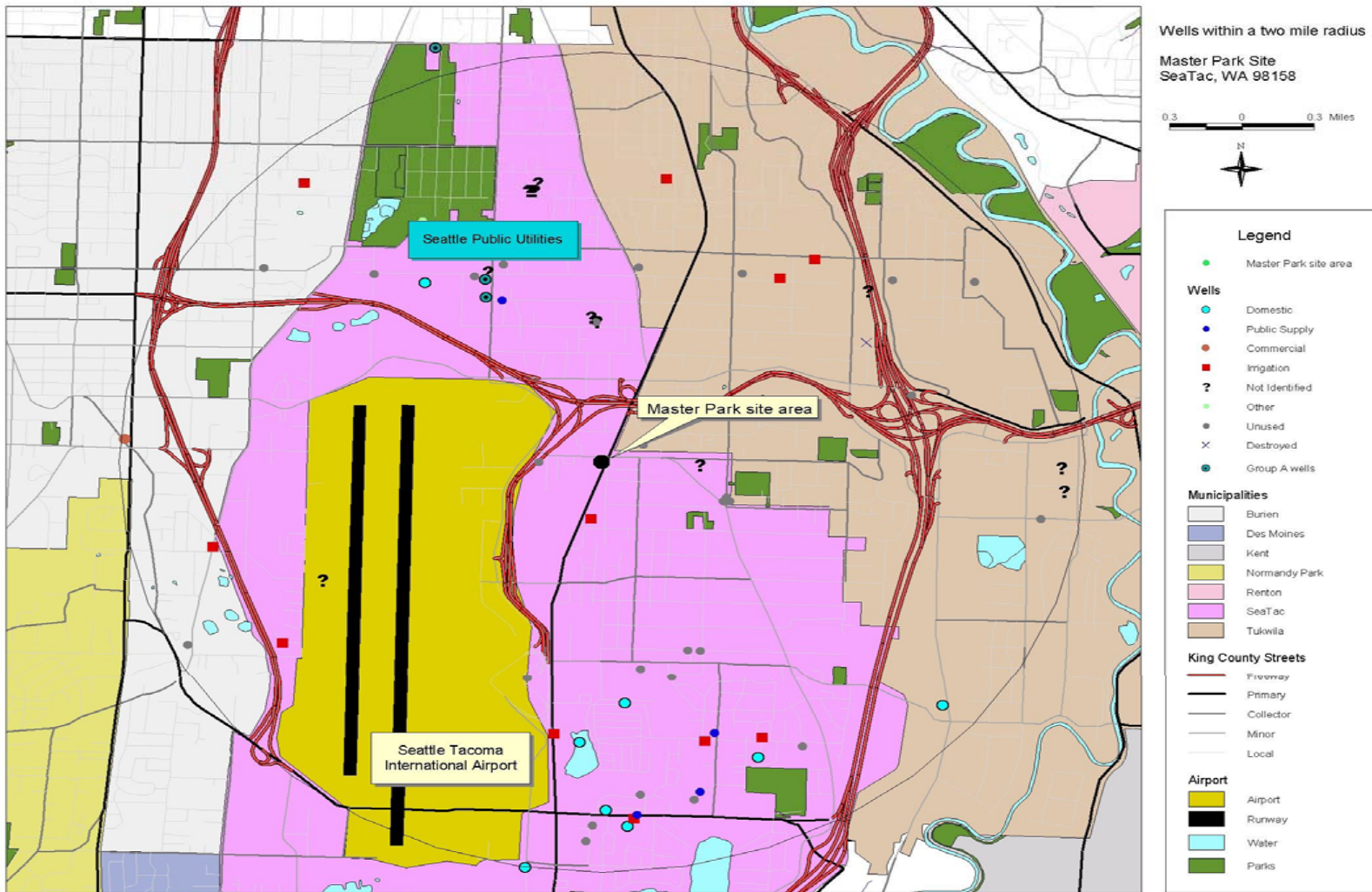


Figure 2 – Master Park wells within 2 miles SeaTac, Washington

Certification

This Contaminated Groundwater Evaluation of the Master Park Site, SeaTac, Washington Public Health Consultation was prepared by the Washington State Department of Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedures existing at the time the health consultation were initiated. Editorial review was completed by the Cooperative Agreement partner.

Technical Project Officer, CAT, SPAB, DHAC

The Division of Health Assessment and Consultation (DHAC) ATSDR, has reviewed this health consultation and concurs with the findings.

Team Lead, CAT, SPAB, DHAC, ATSDR